AMERICAN MUSEUM NOVITATES

Number 678 Published by THE AMERICAN MUSEUM OF NATURAL HISTORY New York City Dec. 2, 1933

56.81,4 C: 14.71,4

A SKULL OF *CROCODILUS CLAVIS* COPE, IN THE UNITED STATES NATIONAL MUSEUM[1]

BY CHARLES C. MOOK

INTRODUCTION

In the collections of the United States National Museum is a fairly well-preserved skull of *Crocodilus clavis* Cope, that exhibits characters of this species not heretofore put on record. My thanks are due to Mr. Charles W. Gilmore, Curator of Vertebrate Paleontology in the U. S. National Museum, for permission to describe this specimen.

GENERAL FORM OF THE SKULL

The skull is of moderate size and is moderately broad in proportion to its length. The length of the snout is about one and a half times its breadth at the base. Its lateral borders converge forward more rapidly than do the lateral borders of the cranial table. The notches which receive the fourth lower teeth are of moderate depth. They separate off a tip of the snout which is only slightly broader than it is long.

The cranial table is flat. This character may be accentuated by crushing, but is not entirely due to this cause. The lateral borders of the cranial table are nearly parallel. The antero-external corners of the table are broadly rounded. The postero-external corners are produced considerably backward. The mid-region also extends backward somewhat. This makes the posterior border wavy in form.

The plate between the supratemporal fenestrae is of moderate breadth, and is about equal in breadth to the space between each fenestra and the posterior border and to the bar between each fenestra and the external border. It is narrower than the bar between each fenestra and the corresponding orbit. It is much narrower than the broad, flat, interorbital plate.

THE CAVITIES OF THE SKULL

EXTERNAL NARIAL APERTURE.—The borders of the external narial aperture are not completely preserved, but they are sufficiently preserved to indicate that the aperture was bluntly pear-shaped. Its breadth is

[1]Contributions to the Osteology, Affinities, and Distribution of the Crocodilia, No. 27.

about two-thirds of its length. *The entire aperture is anterior in position to the lateral notches.* This is a distinctive character, as in many crocodilians the aperture extends backward beyond the level of the notches.

ORBITS.—The borders of the orbits are not complete, but it is apparent that they were of moderate size, and that their length was considerably greater than their breadth. The interorbital plate separating them is broad and flat.

SUPRATEMPORAL FENESTRAE.—The supratemporal fenestrae are of moderate size. The antero-posterior diameter of each is about equal to the transverse diameter. The fenestrae are not circular, however, but are elongated obliquely, the axes of greatest length making angles slightly greater than 45° with the antero-posterior direction; they converge posteriorly.

PREMAXILLARY FORAMEN.—The region of the palate surrounding the premaxillary foramen is not preserved, so that the boundaries of that foramen cannot be determined. It is clear, however, that the foramen could not have been very large.

PALATINE FENESTRAE.—The palatine fenestrae are very long and narrow. The left one, whose boundaries are complete, has a length two and a half times as great as its breadth. The length of this fenestra is twenty-nine per cent. of the total length of the skull from the tip of the snout to the occipital condyle.

These fenestrae extend from the level of the tenth maxillary teeth to a level slightly back of the posterior end of the tooth row. The breadth of the left fenestra is slightly greater than that of the right, due to crushing. The palatine plate between the two fenestrae is about as broad as the average breadth of the fenestrae. The boundaries are irregular.

INTERNAL NARIAL APERTURE.—The pterygoids are incompletely preserved, but the anterior border of the internal narial aperture is clearly visible. The position of this border is slightly anterior to a point halfway between the intersection of the palatine-pterygoid suture at the mid-line and the descending process of the basioccipital. This is slightly anterior to the normal position in the living crocodilians, and considerably posterior to the position in the normal Mesozoic forms. It is in an expected position for an Upper Eocene crocodile.

THE BONES OF THE SKULL

While the preservation of the skull is not complete enough to permit detailed description of many of the skull bones, some of the characters of many of the bones are sufficiently clear to warrant description.

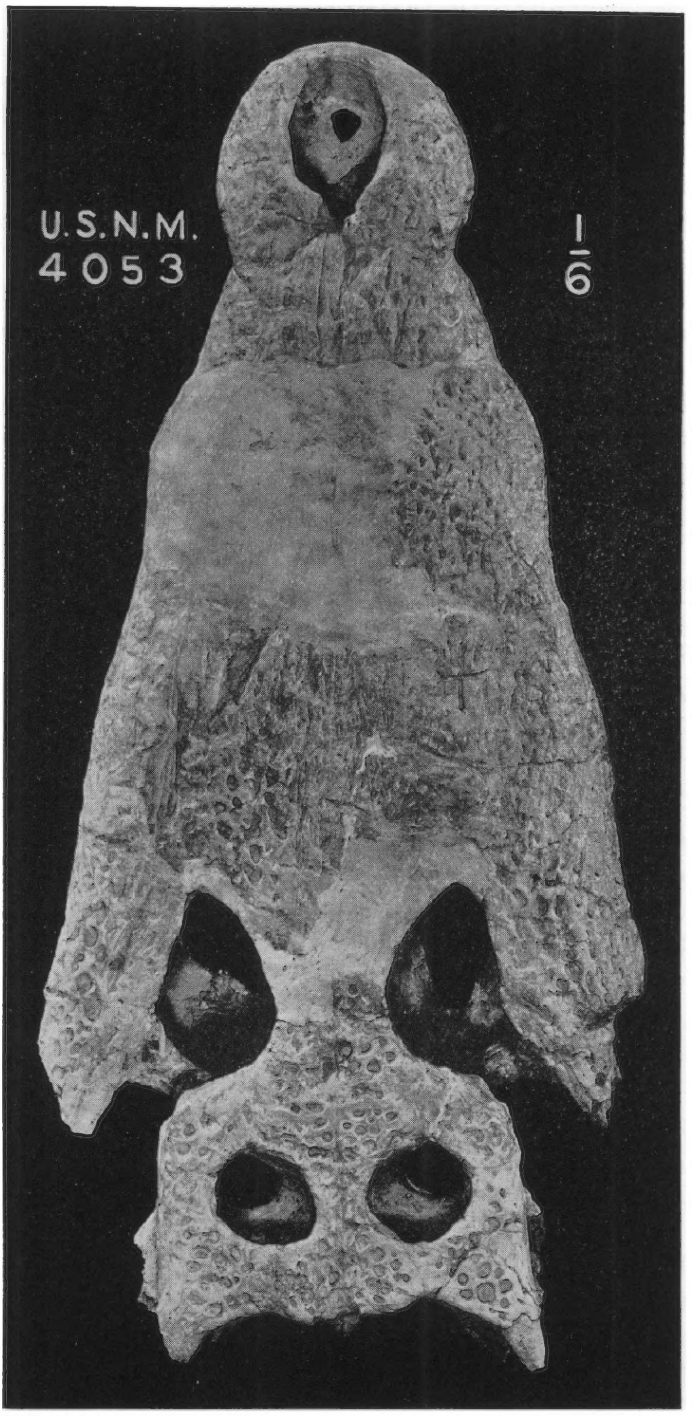

Fig. 1. *Crocodilus clavis* Cope. Skull (U. S. Nat. Mus. No. 4053). One-sixth natural size. Superior view.

PREMAXILLARIES.—The premaxillaries are very short anterior to the external narial aperture, and are broad between the aperture and the lateral borders of the snout. The posterior processes are not preserved, but by projecting the premaxillo-maxillary sutures and the maxillo-nasal sutures backward, it appears probable that these processes extended back to the level of the fifth maxillary teeth.

On the palate the length of the premaxillaries is about equal to the maximum breadth of the two of them. The premaxillo-maxillary suture extends almost directly inward and backward from the lateral notch to the mid-line, and back to the opposite notch. The intersection of this suture with the mid-line is slightly anterior to the level of the posterior borders of the first premaxillary teeth.

Each premaxillary evidently had five teeth. The alveoli of the five on the left side are preserved, and three on the right side. In relative order of size, from the first to the fifth, as determined from the alveoli, these teeth are: second, smallest; first, second in size; third and fifth equal and slightly larger; and fourth, the largest. The first alveolus is close to the mid-line, and is widely separated from the second. The second is very close to the third. The third is moderately close to the fourth, and the fourth is moderately close to the fifth.

MAXILLARIES.—The maxillaries widen rapidly posterior to the premaxillo-maxillary notch. Their contacts with the premaxillaries and the nasals are obscure or missing on the skull top, but the maxillo-nasal sutures may be reasonably interpreted as extending from the level of the fifth to the level of the eleventh maxillary teeth. The postero-lateral processes extend back to the level of the centers of the orbits.

The premaxillo-maxillary suture on the palate has been described above. The maxillaries are incomplete along the mid-line, and the level of the anterior point of their intersection with the palatines cannot be determined.

All of the alveoli of the right side, and many of those of the left side, are preserved. The first five are close together, and increase in size regularly from the first to the fifth; the fifth is much larger than the fourth. The sixth is very close to the fifth and is slightly larger than the fourth. The seventh is moderately distant from the sixth. The seventh, eighth, and ninth are close together, and are about equal in size to the third. The tenth is equal in size to the seventh, eighth, or ninth, but is separated somewhat from the ninth. The eleventh is somewhat separated from the tenth. The eleventh to the sixteenth alveoli, inclusive, are all close together, and decrease regularly in size from the eleventh backward. The eleventh alveolus is second in size to the fifth.

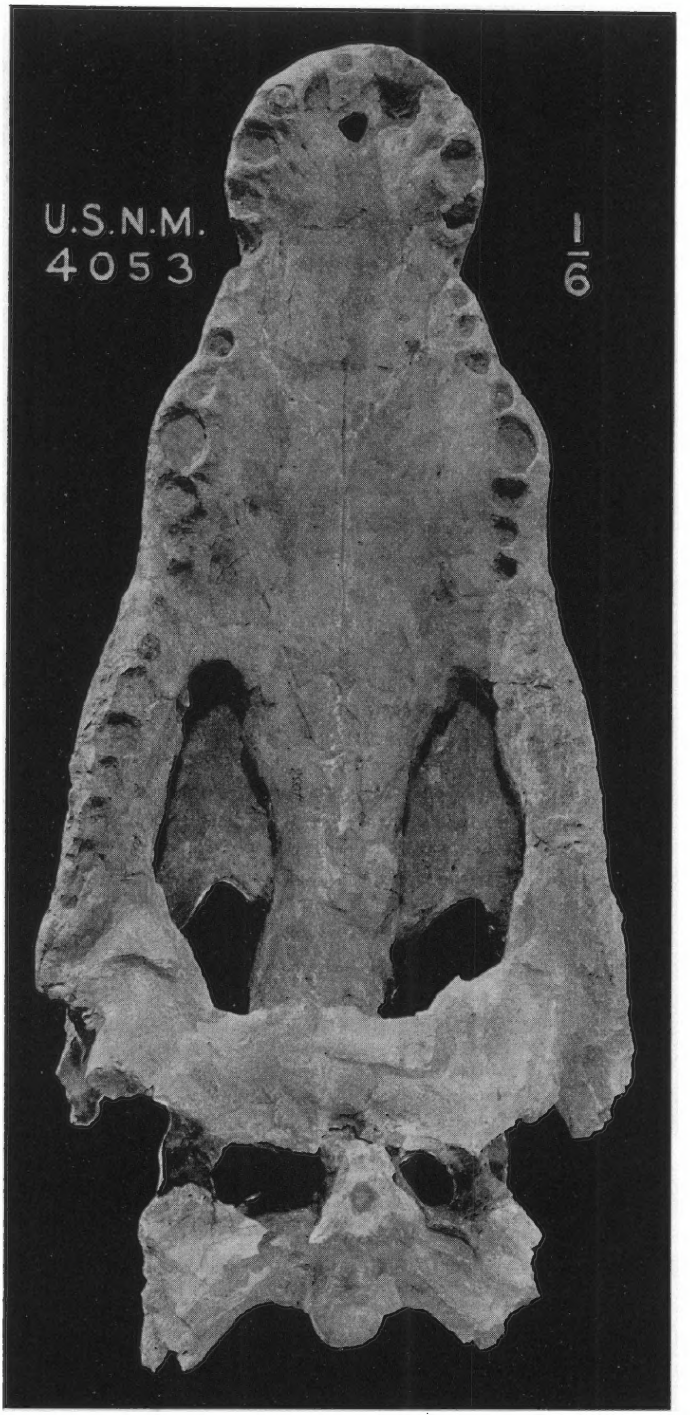

Fig. 2. *Crocodilus clavis* Cope. Skull (U. S. Nat. Mus. No. 4053). One-sixth natural size. Inferior view.

FRONTAL.—The frontal is unusually broad between the orbits. It forms no part of the boundaries of the supratemporal fenestrae. The supraoccipital occupies a small area of the surface of the cranial table.

OTHER BONES.—Other bones are not sufficiently distinctive, as preserved, to warrant detailed description.

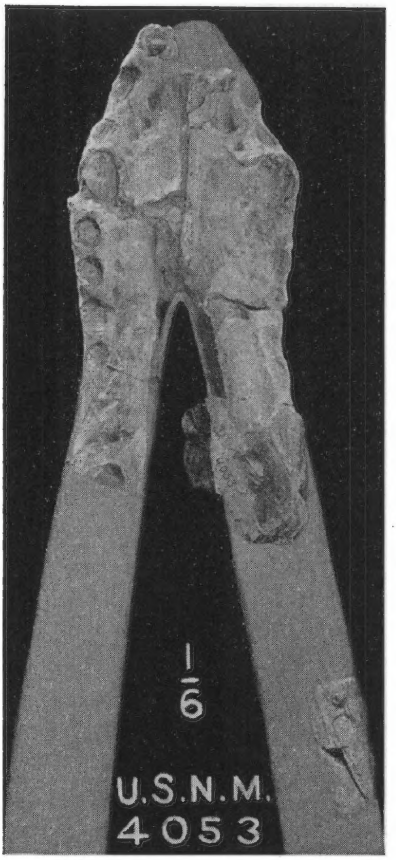

Fig. 3. *Crocodilus clavis* Cope. Portions of mandible (U. S. Nat. Mus. 4053). One-sixth natural size. Superior view.

LOWER JAWS

The symphysial region, and a portion of the right ramus at the posterior end of the tooth row, are fairly well preserved. The symphysis is relatively long and narrow. Its breadth is about four-fifths of its length. The anterior portion of the left ramus is particularly well preserved. In it 6 alveoli are preserved in the symphysial region. The first alveolus contains the broken base of a tooth. All of the alveoli are elongate in outline. This does not indicate that the cross-sections of the teeth were oval, but that the teeth were inclined in position, extending forward as well as upward from bases to crowns. The fourth alveolus is much larger than the other five, which are subequal in size. The first and second, and the second and third teeth are spaced moderately far apart, but the third and fourth, the fourth and fifth, and the fifth and sixth, are all close together. Farther back this ramus contains five more alveoli. The outlines of some of these are not clear. This ramus is not preserved posterior to the eleventh teeth. The right ramus has the region of the first alveolus missing, but the second to the ninth are present. Posterior to the ninth is an irregular portion of the dentary which might have lodged three more alveoli. Posterior to this the ramus is not preserved except for a small isolated fragment. This fragment contains

the last two alveoli, with the next to the last tooth almost complete. The extent of the missing portion between this fragment and the anterior portion of the jaw is uncertain: By placing both anterior portion and fragment in contact with the skull the position of the fragment with the anterior portion of the ramus can be determined with a fair degree of accuracy. By this method it appears likely that three or four teeth were lodged in the missing portion. This would mean seventeen or eighteen teeth for the ramus. This is too many for the genus *Crocodilus*, as we understand the genus to-day, but corresponds with the number in several Eocene species usually referred to *Crocodilus*. Pending a revision of the Bridger species of *Crocodilus*, the species *clavis* may be retained in the genus *Crocodilus*. Such a revision may necessitate its reference to a different genus. The splenial bones evidently did not reach the symphysis.

CONCLUSIONS

The material described enables us to determine certain characters of this species that have not been listed before, especially the characters of the symphysis of the lower jaw.